

REMARKS

In the last Office Action, claims 3, 11, 13 and 17-21 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for reasons noted by the Examiner. Claims 1, 6-9, 12, 14, 15, 22 and 23 were rejected under 35 U.S.C. §102(b) as being anticipated by Takahashi (U.S. Patent No. 6,536,962) and claims 11, 13 and 17, as understood, were rejected under 35 U.S.C. §102(b) as being anticipated by Takahashi. Claims 2, 4 and 5 and, as understood, claims 18, 20 and 21, were rejected under 35 U.S.C. §103(a) as being unpatentable over Takahashi and Seo et al. (U.S. Patent No. 5,555,050) in view of Itoh et al. (U.S. Patent No. 4,306,164). Claims 10 and 16 were rejected under 35 U.S.C. §103(a) as being unpatentable over Takahashi in view of Tanikawa et al. (U.S. Patent No. 6,485,200).

The Examiner acknowledged applicants' claim for foreign priority under 35 U.S.C. §119 though did not indicate receipt of the priority document filed with the application. It is requested that the Examiner acknowledge receipt of the priority document in the next communication to ensure that the priority claim has been perfected. No objections were made to the drawings, which are therefore believed to be acceptable.

In accordance with this response, claims 1, 2, 6, 7, 9, 12, 20, 22 and 23 have been amended, and claims 3, 11, 13 and 17-19 have been canceled. No amendment has been made to pending claims 4, 5, 8, 10, 14-16 and 21. The specification has been revised to correct informalities and inconsistencies and to include terminology consistent with that used in the amended claims.

The present invention pertains to a sector drive unit for a camera and comprises, with reference to the embodiment illustrated by way of example in the drawings, a base plate 1 provided with an aperture 1a, one or more sectors 12 for opening and closing the aperture 1a, an electromagnetic actuator 4 for driving the one or more sectors 12 via a parallel link mechanism to open and close the aperture 1a, and a driving force transmitting mechanism 7 for driving the one or more sectors from one of an aperture-opening position and an aperture-closing position to the other of the aperture-opening position and the aperture-closing position by one-pulse drive of the electromagnetic actuator 4. More specifically, the electromagnetic actuator 4 is pulse-driven as described on pages 9 and 14-17 of the specification and produces an output motion in one direction in response to one pulse of one polarity and produces an output motion in an opposite direction in response to one pulse of opposite polarity.

In the illustrative embodiment shown in the drawings, the electromagnetic actuator 4 comprises a pulse motor whose rotor 4c undergoes rotary output motion in one direction in response to one pulse of negative current flowing through the motor drive coil 4b (Fig. 5) to effect opening of the one or more sectors 12 and undergoes rotary output motion in the opposite direction in response to one pulse of positive current flowing through the motor coil 4b to effect driving of the one or more sectors to the closed position. In the illustrated embodiment, the driving force transmitting mechanism 7 includes a drive gear 8 connected to be driven by the output motion of the electromagnetic actuator 4, and a sector drive gear 9 driven by the driving gear 8 for driving the one or more sectors via a parallel link mechanism between the open and closed positions. A sector urging spring is provided for urging the one or more sectors 12 in one direction which, in the illustrated embodiment, is the opening direction, to facilitate the opening operation of the one or more sectors 12 and to reduce rattling due to slight size variations and play between the parts of the driving force transmitting mechanism 7 and the one or more sectors 12, to thereby securely open or close the aperture 1a.

Amended independent claim 1 recites a sector drive unit for a camera having a base plate provided with an

aperture, one or more sectors for opening and closing the aperture, an electromagnetic actuator for driving the sectors to open and close the aperture, and a driving force transmitting mechanism that drives the one or more sectors via a parallel link mechanism from one of an aperture-opening position and an aperture-closing position to the other of the aperture-opening position and the aperture-closing position by one-pulse drive of the electromagnetic actuator.

Amended independent claim 12 recites a sector drive unit for a camera comprising a sector unit having a base plate provided with an aperture, and one or more sectors movably mounted adjacent to the aperture for opening and closing the aperture; a pulse-driven electromagnetic actuator that produces an output motion in one direction in response to one pulse of one polarity and produces an output motion in an opposite direction in response to one pulse of opposite polarity; and a driving force transmitting mechanism responsive to one-pulse drive of the electromagnetic actuator to drive the one or more sectors via a parallel link mechanism from one of an aperture-opening position and an aperture-closing position to the other of the aperture-opening position and the aperture-closing position.

The prior art does not disclose or suggest a sector drive unit corresponding to that recited in amended claims 1 and 12.

The principal reference to Takahashi discloses a sector drive unit for a camera having an electromagnetic actuator 16 comprised of a rotary DC motor or a rotary step motor, and a driving force transmitting mechanism comprised of a series of gears and levers for transmitting a driving force of the actuator 16 to a set of sectors 31-35. The motor 16 is driven by a plurality of pulses to rotate the rotor of the motor one or more turns in order to drive the sectors in an opening direction to an open position and in a closing direction to a closed position. By contrast, independent claims 1 and 12 require one-pulse drive of the electromagnetic actuator from one of an open position and a closed position to the other of the open position and the closed position. The use of a one-pulse drive reduces the amount of time taken to actuate the one or more sectors and results in a much more simplified construction of the driving force transmitting mechanism than that required by Takahashi.

Moreover, none of the other cited references teach or suggest that sectors can be driven to open or close an aperture by one-pulse drive of an electromagnetic actuator. In the absence of any such teaching in the prior art, there is no motivation that would have led one of ordinary skill in the art to modify Takahashi in the manner required to meet the terms of independent claims 1 and 12. In the context of

obviousness rejections based upon the purported obviousness of effecting a required modification, the Federal Circuit has held that "[t]he mere fact that the prior art may be modified in [a given] manner...does not make the modification obvious unless the prior art suggested the desirability of the modification". In re Fritch, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992). Here, there is nothing in the prior that would have suggested modifying Takahashi to use a one-pulse drive scheme as required by the pending claims.

Dependent claims 7 and 23 require a sector urging spring provided on the driving force transmitting mechanism or on a sector for urging the one or more sectors in one of the aperture-opening direction and the aperture-closing direction. The sector urging spring absorbs deformation or rattling generated by the driving force transmitting mechanism or the one or more sectors, thereby ensuring that the one or more sectors securely open and close the aperture. Neither Takahashi nor the other references of record disclose provision of such a sector urging spring.

In view of the foregoing amendments and discussion, the application is now believed to be in allowable form. Accordingly, favorable reconsideration and passage of the application to issue are respectfully requested.

Respectfully submitted,

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JANUARY 5, 2006  
Date